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ABSTRACT

This curriculum guide contains five units that provide the basic curriculum components required to develop lesson plans for the masonry curriculum. The guide is not intended to be a complete, self-contained curriculum, but instead provides the teacher with a number of informational items related to the learning outcomes and allows the teacher flexibility to design instructional activities, select resources, and deliver instruction most appropriate for the learner and learning environment. The units of instruction contain the following components: learning outcomes; associated tasks; performance standards; lists of tools, equipment, resources, and limiting constraints; performance steps; and enabling objectives. The units cover the following topics: foundations and footings; laying a jointing and pointing; constructing residential chimneys and fireplaces; constructing buildings; and constructing concrete masonry. (KC)

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VOCATIONAL EDUCATION CURRICULUM GUIDE

INDUSTRIAL AND TECHNICAL EDUCATION

Program Improvement Through

C·B·V·T·E

Competency Based Education

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MASONRY

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Preface

The concept of competency based vocational-technical education has been supported by the Bureau of Vocational, Technical and Adult Education for a number of years. Since the early 1970's, the State has sponored the development and dissemination of numerous competency based curricula through the State Vocational Curriculum Laboratory. With the recent development of the State Master Plan for Public Education, however, the need to move rapidly toward systemwide adoption of this instructional concept in all schools is mandated by State Board of Education Policy.

According to the State Master Plan for Public Education, all instructional programs are to be learner oriented and described in terms of high quality, measurable, student centered outcomes (learning outcomes). In essence, this policy reinforces the competency-based vocational education philosophy.

Consistent with our current efforts in encouraging the implementation of vocational education learning outcomes, we have prepared this curriculum guide to assist vocational teachers as they prepare lesson plans that are reflective of the mandated core curriculum and defensible in terms of an equitable, quality vocational program.

Additional copies of this curriculum guide may be obtained from the:

West Virginia Vocational Curriculum Laboratory
Cedar Lakes Conference Center
Ripley, West Virginia 25271
Telephone: (304) 372-7021
Toll Free: 1-800-WVA-JOBS (in state)

Any suggestions you have for improving this material may be sent to your Vocational Curriculum Laboratory. Through this feedback, we plan to continually update and revise our materials.

VOCATIONAL, TECHNICAL AND ADULT EDUCATION

Clarence E. Burdette
Assistant State Superintendent of Schools

The contents of this guide provide the basic curriculum components required to develop lesson plans that address the learning outcomes for this particular area of study. As such, this guide is not intended to be a complete, self-contained curriculum. Instead, the teacher is provided a number of informational items related to the learning outcomes and allowed the flexibility to design instructional activities, select resources and deliver instruction most appropriate for the learner and learning environment.

Specifically, this curriculum guide is organized in the following manner:

Units of Instruction (Where applicable)

A unit of instruction is a group or cluster of related learning outcomes that have been placed together for their similarity or main idea of task accomplishment. An example of a Unit would be Shielded Metal Arc Welding within the welding and cutting area of study.

Learning Outcomes

A learning outcome, oftentimes synomous with a competency statement, is a concise description of the curriculum in terms of desired learner behavior. Such statements are measurable, may contain one or more tasks and be action oriented. All approved learning outcomes for vocational education have undergone a strigent verification process with input from teachers and representatives of the business and/or industrial sector.

The approved learning outcomes for a specific vocational education area of study represent the core competencies of what has been identified as a quality vocational education experience. They do not, however, represent the entire instructional program for any area of study. It is hoped that all vocational instructors and local educational agencies will provide learners with educational experiences that exceed the "core competencies" identified through the learning outcomes.

Associated Tasks

A task represents an identifiable behavior that (1) has a purpose; (2) has a definite beginning and ending; (3) contains two or more steps none of which is a restatement of the original task statement if in the psychomotor domain; and (4) has a standard of performance which can be defined, described and verified. Learning outcome statements may be on the task level or may contain two or more independent tasks.

Examples of task/behavior statements are:

1. Chase external pipe threads.
2. Bleed diesel fuel system.
3. Use common standard medical abbreviations.
4. Prepare a resume.
5. Plan food experiences suitable for young children.

Performance Standards

The Standard is defined as criteria for assessing if tasks are performed or demonstrated as either acceptable or unacceptable. The performance standard communicates to the learner the quantity and quality of how well he or she is expected to complete the task. The standard can be stated in terms such as actual percentage of achievement, the accuracy expected, the number of errors permitted, the time allowed to complete the task, the degree, or any other appropriate level at which achievement is anticipated. The standard should be based on the performance level needed on the job.

Examples of standards are:

1. The circuit board must operate within the tolerances of the circuit design.
2. The estimate must be within + or -5% of that figured by the instructor.
3. Contacts must open when more than 125% of rated current value is made to pass through the overload relay heating element or coil.
4. The installation must be complete and each conductor must be terminated according to the schematic drawing of the design.
5. The motor must carry the load without being overloaded; the directions of rotation must be correct; belt must have a deflection of between 3/8" or 1/2".

Tools, Equipment, Resources and Situation(s)

Situation(s) is defined as the limiting constraints under which actions are to occur. The circumstances or restrictions imposed on the learner when he or she is demonstrating the behavior must be defined. Frequently, the conditions identify the testing situation used to determine learner achievement of the standard. Tools and equipment are the materials needed to perform the task being addressed in each performance standard.

Performance Steps

Performance steps are a series of steps required to perform a psychomotor task. The steps (1) are arranged in the sequence ordinarily followed on the job, (2) have a concise start and close, (3) are limited to the accompanying task statement, and

(4) are self-supporting and do not refer to actions beyond the task performance. Performance steps developed for each task are used to determine the enabling objectives and steps and procedures for performance checklist(s) to be utilized in assessing learner mastery of the task.

Enabling Objectives

Enabling objectives reflect the knowledges, attitudes and related skills the learner must possess in order to complete the task to the specified standard(s). As such, enabling objectives are derived from an instructional analysis of the task and/or performance steps and are stated in measurable terms of student performance.

Terms such as "define verbally," "construct," "diagram" and "list" are used to express enabling objectives, rather than obscure verbs like "know," "learn" and "understand". Examples of acceptable enabling objectives are:

1. List verbally the parts of a voltmeter.
2. Define Ohm's Law.
3. Explain relevant safety precautions and procedures.
4. Discriminate between types of life insurance policies.

Given this information for each outcome statement, the instructor is encouraged to develop the following components for lesson planning, delivery and evaluation.

Develop Instructional Activities

Instructional activities should be designed to provide the learner with experiences related to the enabling objectives, cumulating in successful task performance. The instructional activity section of a curriculum should contain a variety of strategies designed for the learners' varying learning styles and rates.

Consideration should be given to age, ability levels, educational levels, varied learning styles, individual interests, career goals, and emotional needs when developing the instructional activities. Activities should include suggestions for large groups, small groups and individual methods. The use of small groups may help students attain the skills, knowledge and attitudes associated with each task by making them (1) feel adequate and physically competent when they lack the necessary background information and experience; (2) feel a sense of security through the reenforcement of positive group attitudes; (3) gain confidence and discover that they are an essential part

of a team engaged in the learning-teaching process; (4) learn to work without direct supervision, and (5) vary instructional routines away from lecture or other full-class methods.

Identify Appropriate Instructional Resources

Instructional resources should be identified for each instructional activity and should be designed to help convey the message of the task and enabling objective(s). Attempts should be made to utilize modern instructional technology (i.e. television, computers, videotapes, etc.) as much as possible in delivering the message desired. However, caution is advised in limiting the suggested resource section to only one alternative; due to the differing availability of resources between like programs across the state.

Provide Instruction

Many misconceptions exist about how an individual teacher must manage the instructional process when utilizing the competency based approach. Oftentimes CBE is considered synonmous with individualized instruction, wherein the instructor becomes the instructional manager of the educational process instead of the more traditional view of the teacher. Such misconceptions have led many educators to renounce competency based education as a means by which the teacher loses control and direction over the instructional process and is relegated to merely a role of record keeper.

The underlying concept of competency based instruction, however, does not dictate specific instructional procedures and methodologies, but rather assures that those skills, knowledges and attitudes deemed essential for job success are taught, mastered to acceptable standards and documented. How this instruction is managed within the classroom, be it on a large group, small group or individualized basis should be left up to the instructor.

The content of the task itself and the enabling objectives dictate what should be taught. Thus, the instructional activities and supporting resources identified in the instructional plan must be designed to accommodate learner mastery of the subject matter. Where appropriate, this instruction may involve large group activities, smaller group participation and/or solely individualized study.

Where substantial diversity exists between ability and skill levels of the learners within a class, arrangements should be made to structure learning activities that accommodate this difference. This type of instructional arrangement is particularly crucial, given that one of the major premises of competency based instruction is that the learner be allowed to progress at his/her own pace and that this progression be based upon successful mastery of sequential competencies.

Also, another major consideration that must be given to providing competency-based instruction is the development of a mechanism whereby learners, due to prior experience or instruction, be allowed to "test out" on skills already attained without undue duplication of effort. This situation is most often addressed through the use of pretests prior to formal instruction.

*Evaluate Learner Performance

Evaluation of learner performance is one of the most critical steps in the instructional process. Criterion-referenced evaluative measures are advocated over the traditional norm-referenced approach due to the importance of all learners being able to perform to specialized standards. As such, the evaluation of learning outcomes and their related tasks should include means of assessing learner mastery of the knowledges, attitudes, and skills outlined in the enabling objectives and regarded as essential for completion of the learning outcomes/ tasks, and also, learner performance of the learning outcomes/ tasks to the performance standard.

In order to adequately evaluate learners, consideration must be given to constructing testing situations that address any or all of the three domains of learning encompassed within the learning outcome or task (i.e., psychomotor, cognitive, and affective).

*Note: The Bureau of Vocational, Technical and Adult Education is currently in the process or has developed comprehensive test item banks (written and performance) for a number of vocational education areas of study. For information relative to the availability of these item banks, contact the Assistant Director, Curriculum and Personnel Development.

Guide Coding System

Example: 4.2.3

4. - unit designation
2. - learning outcome under unit
3 - task under learning outcome

VOCATIONAL EDUCATION CURRICULUM GUIDE

MASONRY

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PROGRAM OF STUDY: Industrial and Technical Education

AREA OF STUDY: Masonry

LEVEL: 11-12

UNIT #1: Foundations and Footings

LEARNING OUTCOME #1.1: Layout buildings using a transit.

TASK(S): 1.1.1. Layout buildings using a transit

TASK #: 1.1.1. Layout buildings using a transit

PERFORMANCE STANDARD: Given a plot and foundation plans, builder's transit, 100 foot tape, and the necessary tools and materials, lay out building site, stakes for corner location, footing lines and batter boards. All building lines must be located to exact measurements according to dimensions on the blueprint.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Sledge hammer	Heavy cord or twine	Corner stakes
Claw hammer	Batter boards (2"x4"x3')	Safety goggles
Crosscut handsaw	Ledger boards (1"x6"x6')	Nails
Plumb bob	Braces (1"x4"x6')	
100 ft. tape	Builder's level and/or transit	

PERFORMANCE STEPS:

1. Locate house on lot in compliance with local regulations.
2. Decide on house location, natural drainage, level and rough clear the site.
3. Layout the outside foundation lines.
4. Locate and square corners.
5. Locate the lengthwise girder location, usually on the centerline of the house.
6. Check for foundation levelness.

ENABLING OBJECTIVES:

Locate building lines on a foundation plan

Locate reference point

Transfer site information from plan to plot

Select and use equipment

Describe the procedure for locating and aligning with a benchmark

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #1.2: Build footings, forms, and construct piers.

TASK(S): 1.2.1. Build footing forms
1.2.2. Build forms for concrete slabs
1.2.3. Build forms for concrete walls
1.2.4. Construct piers

TASK #: 1.2.1. Build footing forms

PERFORMANCE STANDARD: Given previously erected batter boards, a set of working drawings, footing specifications, dimensioned lumber, and the necessary tools, equipment, and materials, construct footing forms. All forms must be straight and plumb and assembled to specifications $\pm 1/8$". The inside line of the form wall must coincide with the building lines. All stakes must be secure with form ties and bracing firmly attached to prevent movement of the forms when concrete is poured. The distance between stakes must not exceed twice the width of the footing.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Saw	Builder's level	Sheathing boards
Hammers	Transit	Nails
Tape measure (100 ft.)	Plumb bob	Form oil
Hand level	Stakes	Safety goggles
String		

PERFORMANCE STEPS:

1. Locate the markings on the batter boards that indicate the building lines.
2. Drop a plumb bob from the intersection of the two lines to a point to locate the building corner.
3. Drive a corner stake at this location and drive a nail in top of it at the exact point where the plumb bob touches it.
4. Transfer bench mark at bottom of excavation.
5. Repeat step 2 at all four corners.
6. Measure from the building corner stakes to the inside of the footing plus the thickness of the sheathing board; locate and drive the corner form stakes; leave the top of the stakes 1 to 2 inches above the gradepoint.
7. Stretch a string between the corner stakes one inch above the gradepoint.
8. Drive intermediate stakes at about four-foot intervals.
9. Place sheathing boards in position and nail them to the stake one inch below the string. (NOTE: Form oil must be applied before installation.)
10. Cut a spreader the width of the footing to locate the position of the outside stakes. (NOTE: Remember to allow for the thickness of the sheathing when locating stakes.)
11. Lay out all pilaster footings on inside form.

12. Drive stakes and attach outside sheathing boards to the stakes.
13. Nail cleats across top of form.
14. Align forms by bracing or blocking.

ENABLING OBJECTIVES:

Identify square-type and T-type footing forms

Explain the use of a spreader to check form width

Describe the procedure for constructing footing forms

Explain the relevant safety precautions/procedures

TASK #: 1.2.2. Build forms for concrete slabs

PERFORMANCE STANDARD: Given previously erected batter boards, a set of working drawings, slab specifications, dimensioned lumber, and the necessary tools, equipment, and materials, construct slab forms. All forms must be plumb and straight and assembled to specifications $\pm$1/8". The stakes must be secure with ties and bracing securely attached to prevent movement of the forms when concrete is poured.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Electric saw	Level, hand 30"	Framing square
Hammer (16 oz. claw)	Chalk line	Stakes (2"x4")
Sledge hammer	String line	Sheathing
Tape measure	Plumb bob	Form ties and holders for walls and pilasters
Safety goggles		

PERFORMANCE STEPS:

1. Determine size of job.
2. Establish height of project with one stake.
3. After width and depth have been determined, set up lumber for forms.
4. Place stakes 2 to 3 feet apart.
5. Drive stakes so they will be firm.
6. Tie form and stake together by driving double-headed nails through the stake into the form.
7. Keep top edge of stake level with or below form boards.
8. Explain safety rules and necessary precautions.

ENABLING OBJECTIVES:

Identify applications for slab foundations

Identify materials used in constructing slab forms

Describe the procedure for constructing slab forms

Explain the relevant safety precautions/procedures

TASK #: 1.2.3. Build forms for concrete walls (plywood)

PERFORMANCE STANDARD: Wall must be secure, plumb, and aligned as specified in plans; and wall form must be structurally able to hold concrete; nail heads must be flush to panel.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Hammer	Builder's level	Stiff backs
Square	Electric drill and bits	Straight stock
Chalk line	Plywood panels	Walers
Crescent saw	Plans and specifications	Safety goggles
Tape measure	Snap ties	

PERFORMANCE STEPS:

1. Check plans and specifications for dimensions.
2. Measure and cut panels and plates (top, bottom, and center plates) for all panel assemblies.
3. Nail plates to panels.
4. Lay out and strike chalk line on footer for wall tie.
5. Nail first panel assembly through bottom plate to line on footer.
6. Level panel.
7. Install temporary brace.
8. Align and nail second panel assembly with first panel assembly.
9. Continue first row of panels to length designated on plans.
10. Install snap ties as specified.
11. Place second row of panels staggering vertical joints.
12. Continue rows of panels until desired height has been achieved.
13. Repeat steps 4 through 12 to install panel assemblies on opposite side of footer.

ENABLING OBJECTIVES:

Identify double wall forms and their applications

Identify materials used in constructing wall forms

Explain why strong, well-braced walls are essential in form construction

Define bulkhead

Explain the use of snap ties and wafers in wall form construction

Describe the procedure for constructing wall foundation forms

Explain the relevant safety precautions/procedures

TASK #: 1.2.4. Construct piers

PERFORMANCE STANDARD: Given necessary equipment, supplies and building specifications, construct a 16 inch by 20 inch pier. Pier must be square, level, plumb and straight-edged. All work must be joined and free of cracks and holes.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Trowel	Round jointer	Mortar
Level	Brush	Mortar pan
Square	Common bricks	Safety goggles

PERFORMANCE STEPS:

1. Dimension, square and mark area for pier.
2. Lay corner masonry unit in mortar and level.
3. Lay remaining masonry units in first course level and straight-edge.
4. Lay corner masonry units in reverse direction on top of first course.
5. Level and plumb from corner to corner.
6. Lay remaining units in course level and straight-edge.
7. Continue to reverse corner units and repeat steps 4, 5, and 6 until desired height is reached.
8. Tool joints.

ENABLING OBJECTIVES:

Describe techniques for planning and laying out a pier

Discuss and demonstrate how to construct a pier

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #1.3: Construct walls containing pilasters.

TASK(S): 1.3.1. Construct walls containing pilasters

TASK #: 1.3.1. Construct walls containing pilasters

PERFORMANCE STANDARD: Given plans and specifications for a wall containing pilasters, bricks, mortar, and the necessary tools, equipment, and materials, construct a wall containing pilasters. Pilasters will be square with the face of the wall, level and plumb, within $\pm 1/16$ inch of specifications for length, height, and width, and have uniform joints tooled to the specified finish.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Trowel	Square	Convex jointer
Level	Brick	Safety goggles
Rule	Mortar mix	

PERFORMANCE STEPS:

1. Determine where pilaster is to be located in wall.
2. Determine dimension of pilaster.
3. Lay out and bond pilaster in wall, making sure pilaster is square and parallel with face of wall.
4. Place anchors or metal ties in pilaster wall.
5. Build around the flush anchors or ties with mortar.
6. Continue to build pilaster as wall progresses.

ENABLING OBJECTIVES:

Explain the difference between pilasters and columns

Describe the procedure for bonding pilasters in walls

Explain and demonstrate the procedure in constructing a wall containing pilasters

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #1.4: Raise and waterproof a foundation.

TASK(S): 1.4.1. Raise a foundation
1.4.2. Waterproof a foundation

TASK #: 1.4.1. Raise a foundation

PERFORMANCE STANDARD: Given necessary equipment, supplies and building specifications, build a masonry foundation wall. Wall must be straight, level, plumb, without bats between leads, and free of cracks and holes. Height of wall must be built to batter board line.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Trowel	Hammer	Mortar
Level	Jointer	Masonry units
Ruler	Mason's line	Mortar pan
Safety goggles		

PERFORMANCE STEPS:

1. Determine height of foundation wall from batter board line.
2. Plumb down from building line to locate position of foundation wall.
3. Lay out first course to determine cuts.

4. Build leads on each end of wall.
5. Put up line and build wall to top of leads using full head joints.
6. Repeat steps 4 and 5 until desired height is reached.

ENABLING OBJECTIVES:

Explain various methods for establishing plumb points on footing

Explain bonding corner with various sizes of concrete blocks

Discuss the function of foundation walls

Explain and demonstrate the procedure in raising a foundation

Explain the relevant safety precautions/procedures

TASK #: 1.4.2. Waterproof a foundation

PERFORMANCE STANDARD: Given a masonry foundation requiring waterproofing and access to necessary tools, equipment, and materials, waterproof the foundation. The correct waterproofing will be selected and applied according to specifications and foundation will be completely dry.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Tar or asphalt
Shovel	Trowel
Gravel	Level
Clay or concrete drain tile	Felt
Hammer	

PERFORMANCE STEPS:

1. Clear dirt from outside edge of the foundation.
2. Determine slope of drainage and mark a guide line on the side of the footing.
3. Place gravel in the opening and level to the line.
4. Install drainage tile.
5. Cover the joints with roofing felt.
6. Properly waterproof the wall if applicable.
7. Gravel fill at an angle to cover the foundation cove and to reach up on the wall.
8. Back fill the foundation and/or wall with dirt.
9. Slope dirt away from foundation.

ENABLING OBJECTIVES:

Identify types of waterproofing materials and applications

Determine selection procedures for material when waterproofing masonry foundations

Describe techniques for preparing the foundation for waterproofing

Describe techniques used for waterproofing foundations

Explain the relevant safety precautions/procedures

PROGRAM OF STUDY: Industrial and Technical Education

AREA OF STUDY: Masonry

LEVEL: 11-12

UNIT #2: Laying Jointing and Pointing

LEARNING OUTCOME #2.1: Bond a block wall.

TASK(S): 2.1.1. Bond a block wall

TASK #: 2.1.1. Bond a block wall

PERFORMANCE STANDARD: Given specified dimensions for a wall, block, and the necessary tools, equipment, and materials, bond a block wall. Joint spacing must be uniform, blocks must be within $\pm$1/16 inch of specified dimensions, and necessary cuts pivot be placed at the corners.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Common brick	Mortar line	4' level
Mortar	Mortar pan	Modular ruler
Chalk line	Framing square	Tape measure
Mason line	Jointer	Safety goggles

PERFORMANCE STEPS:

1. Select brick.
2. Determine size of head joints.
3. Space bricks to given dimensions.
4. Mark each head joint.
5. Remove brick and prepare to lay in mortar.

ENABLING OBJECTIVES:

Describe the procedure for establishing a wall line by using a chalk line

Define the term dry bonding as used in wall and corner construction

Describe the method used for dry bonding a wall for unnecessary cutting

Explain the relevant safety precautions/procedures

Explain and demonstrate the procedure in bonding a wall

LEARNING OUTCOME #2.2: Construct brick veneer and cavity walls.

TASK(S): 2.2.1. Construct a brick veneer wall
2.2.2. Construct cavity walls

TASK #: 2.2.1. Construct brick veneer wall

PERFORMANCE STANDARD: Given plans and specifications for a brick veneer wall, bricks, mortar and the necessary tools, equipment, and materials, construct a brick veneer wall. The wall will be plumb, straight, and level, within $\pm$1/16 inch of specifications for length, height, and width and have uniform joints tooled to specified finish.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Trowel	Corner poles	Bricks
Level	Mason's line	Mortar
Spacing ruler	Jointer	Mortar pan
Safety goggles		

PERFORMANCE STEPS:

1. Determine type of brick to be used.
2. Bond the wall.
3. Scale each course.
4. Lay brick in mortar to scale.
5. Secure wall with ties at desired intervals.
6. Point and joint the wall.

ENABLING OBJECTIVES:

Identify various types of brick walls

Explain the purpose of weep holes

Describe the use of speed leads

Explain the purpose of a vibration joint

Identify the generally accepted methods for laying a brick veneer wall against the frame construction of a house

Explain the relevant safety precautions/procedures

Explain and demonstrate the procedure in laying brick veneer walls

TASK #: 2.2.2. Construct cavity walls

PERFORMANCE STANDARD: Given plans and specifications for a job, and access to necessary tools and materials, construct a cavity wall. The cavity wall will be built according to the blueprint specifications, and cavity space must be kept clear of dropping or fallen mortar.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Plans and specifications
Brick
Mortar
Tool kit
Safety goggles

PERFORMANCE STEPS:

1. Determine width of cavity and type of brick to be used.
2. Bond the wall, allowing for cavity.
3. Scale each course to desired height.
4. Lay brick in mortar to scale.
5. Secure wall with ties at desired intervals.
6. Point and joint the wall.

ENABLING OBJECTIVES:

Describe the various kinds of flashings

Discuss weep holes and their importance

Explain the use of cavity sticks

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.3: Cut a bat and queen closure.

TASK(S): 2.3.1. Cut a bat closure
2.3.2. Cut a queen closure

TASK #: 2.3.1. Cut a bat closure

PERFORMANCE STANDARD: Given the necessary tools, equipment and supplies, cut a bat closure. The performance will be rated acceptable when the closure is cut straight and equals the predetermined size, allowing 1/2 inch clearance for mortar.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Brick
Brick hammer or trowel
Brick set
Safety goggles
Mason rule
Modular ruler
Pencil

PERFORMANCE STEPS:

1. Wear eye protection.
2. Hold the brick firmly for cutting.
3. Score the brick on all four sides.
4. Strike the brick with a hammer or trowel where you want the brick to break.
5. Square the cut side with a hammer if the brick doesn't break clean.

(NOTE: For a bat closure, cut the brick perpendicular to the 8" side.)

ENABLING OBJECTIVES:

Explain and demonstrate how to cut a bat closure

Explain the relevant safety precautions/procedures

TASK #: 2.3.2. Cut a queen closure

PERFORMANCE STANDARD: Given the necessary tools, equipment and supplies, cut a queen closure. The performance will be rated acceptable when the closure is cut straight and equals the predetermined size, allowing 1/2 inch clearance for mortar.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Mason's trowel	Brick hammer
Face brick	Rule
Chalk box	Safety goggles

PERFORMANCE STEPS:

1. Wear an eye protection.
2. Hold the brick firmly for cutting.
3. Score the brick on all four sides.
4. Strike the brick with a brick hammer or trowel where you want the brick to break.

   (NOTE: Cut the brick parallel to the 8 inch side.)

5. Square the cut side with a hammer if the brick does not break clean.

ENABLING OBJECTIVES:

Explain and demonstrate how to cut a queen closure

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.4: Form a corbel.

TASK(S): 2.4.1. Form a corbel

TASK #: 2.4.1. Form a corbel

PERFORMANCE STANDARD: Given plans and specifications and access to necessary tools, equipment and materials form a corbel as specified by plans. All corbeling must be supported and in line ±1/8 inch.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Specifications	Mortar	Level	Trowel
Plans	Rule	Jointer	Safety goggles
Brick	Square	Hammer	

PERFORMANCE STEPS:

1. Define the total projection (how far the final projection comes out from the wall).
2. Determine how much each projection should extend.
3. Lay first corbel course.
4. Complete first course, filling in space between corbel and wall.
5. Lay 2nd and remaining courses:

   (NOTE: Depending on the conditions and situations, use a suitable means of tying z-bars, walls, ties, etc.)

6. Joint and point work.

   (NOTE: Each course must not project more than 2 inches from the previous course. The maximum projection must not exceed 1/2 the thickness of the wall.)

ENABLING OBJECTIVES:

Discuss corbeling and its use

Describe proper way of supporting corbeled bricks

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.5: Gage masonry wall with mortar scale and story pole.

TASK(S): 2.5.1. Gage masonry wall with mortar scale
2.5.2. Gage masonry wall with story pole

TASK #: 2.5.1. Gage masonry wall with mortar scale

PERFORMANCE STANDARD: Provided with necessary equipment, supplies and specifications for gage, gage a masonry wall. The

entire wall must be gaged on a gage of 6 or 4 courses to 11 inches in height with spacing rule.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Masonry wall	Pencil
Standard spacing rule	Safety goggles
Mortar scale	

PERFORMANCE STEPS:

1. Gage first course 2-3/4 inches or on 6 using a spacing rule.
2. Gage second course 5-1/2 inches or 6.
3. Gage all additional courses on 6 up to 71-1/2 inches.
4. Beyond 71-1/2 inches high, all courses will remain on 6 until wall is completed.

ENABLING OBJECTIVES:

Explain and demonstrate how to gage a masonry wall using a mortar scale

Explain the relevant safety precautions/procedures

TASK #: 2.5.2. Gage masonry wall with story pole

PERFORMANCE STANDARD: Provided with necessary equipment, supplies and building specifications, gage a masonry wall with story pole. Story pole must be placed at the bottom of the first course and marked on 6 with spacing rule and all courses gaged on 6 with the story pole.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Masonry spacing rule	Square
10 ft. pole (1"x2"x10')	Safety goggles
Pencil	

PERFORMANCE STEPS:

1. Obtain piece of straight wood to serve as story pole.
2. Mark on story pole the selected gage to be used.
3. Place story pole at given position at the corner of wall.
4. Gage courses at marks on story pole.

ENABLING OBJECTIVES:

Demonstrate how to mark a story pole

Explain and demonstrate how to gage a masonry wall with a story pole

Exlain the relevant safety precautions/procedures

LEARNING OUTCOME #2.6: Lay basket weave, common bond and herringbone pattern.

TASK(S): 2.6.1. Lay a basket weave pattern
2.6.2. Lay a common bond pattern
2.6.3. Lay a herringbone bond pattern

TASK #: 2.6.1. Lay a basket weave pattern

PERFORMANCE STANDARD: Given plans and specifications for a basket weave bond wall, bricks, mortar, and the necessary tools, equipment, and materials, lay a basket weave bond wall. The pattern must be uniform, the wall must be plumb, straight, and level, within ±1/16 inch of specifications for length, height, and width, and have uniform joints.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Brick	Framing square	Brick set chisel
Mortar	V-steel runner jointer	Tool kit
Plumb rule	Modular rule	Safety goggles

PERFORMANCE STEPS:

1. Determine type of brick to use.
2. Prepare area to be laid in a bed of mortar or grout.
3. Lay bricks according to basket weave pattern.
   a. Lay off in 8 inch pattern.
   b. Use a line to lay all brick over 48 inches.
   c. Check pattern with level or straight edge to assure levelness.
   d. Joint and point all brick.

ENABLING OBJECTIVES:

Sketch a basket weave bond pattern

Identify the building code specifications for masonry bonded brick walls

Choose the proper cuts for forming basket weave pattern bond

Explain the relevant safety precautions/procedures

TASK #: 2.6.2. Lay a common bond pattern

PERFORMANCE STANDARD: Given plans and specifications for common bond wall, bricks, mortar, and the necessary tools, equipment, and materials, lay a common bond wall. The pattern must be uniform, the wall must be plumb, straight, and level, within ±1/16 inch of specifications for length, height, and width, and have uniform joints.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Trowel	Jointer	Mortar pan
Level	Mortar	Brush
Modular ruler	Common bricks	Safety goggles

PERFORMANCE STEPS:

1. Lay the bond out dry.
2. Lay first course brick in mortar with veneer bond and on 6 using brick spacing rule.
3. Level and square the first course.
4. Cut 4 six inch pieces.
5. Bed 6 inch piece on each corner on 6.
6. Lay full headers between 6 inch pieces.
7. Level and plumb header course.
   a. Plumb each jam or corner.
   b. Plumb the face side of each corner.
   c. Straight edge the face and kiln side of wall.
8. Lay 5 courses of the veneer bond.
9. Repeat steps 4 through 8.
10. All work must be ranged, jointed and pointed.

ENABLING OBJECTIVES:

Sketch the six different positions of bricks

Sketch a common bond pattern

Identify the building code specifications for masonry bonded brick walls

Choose the proper cuts for forming a common pattern bond

Discuss the procedure and demonstrate laying out and building an 8" wall in common brick

Explain the relevant safety precautions/procedures

TASK #: 2.6.3. Lay a herringbone bond pattern

PERFORMANCE STANDARD: Given plans and specifications for herringbone bond wall, bricks, mortar, and the necessary tools, equipment, and materials, lay a herringbone bond wall. The pattern must be uniform, the wall must be plumb, straight, and level, within $\pm 1/16$ inch of specifications for length, height, and width, and have uniform joints.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Brick	Level
Mortar	Wood triangle
Tool kit	Safety goggles
Square	

PERFORMANCE STEPS:

1. Cut two 2-3/4 inch and two 5-1/2 inch combination pieces.
2. Bevel whole brick on corners.
3. Determine center of pattern.
4. Dry bond the pattern.
5. Bed up first section of pattern using 2-3/4 inch pieces as starter and 5-1/2 inch pieces as next unit.
6. Bevel the end of whole brick to end at the top of 5-3/4 inch piece.
7. Place whole brick across 5-3/4 inch piece and beveled brick.
8. Repeat steps 5, 6 and 7 to the end of herringbone pattern.
9. Square dimensions of desired pattern area.

ENABLING OBJECTIVES:

Sketch a herringbone bond pattern

Identify the building code specifications for masonry bonded brick walls

Choose the proper cuts for forming a herringbone pattern bond

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.7: Lay header, rowlock, sailor, shinny, soldier, and stretcher courses.

TASK(S):
- 2.7.1. Lay a header course
- 2.7.2. Lay a rowlock course
- 2.7.3. Lay a sailor course
- 2.7.4. Lay a shiner course
- 2.7.5. Lay a soldier course
- 2.7.6. Lay a stretcher course

TASK #: 2.7.1. Lay a header course

PERFORMANCE STANDARD: Given specifications for a full header course, blocks, mortar, and the necessary tools and materials, lay a full header course to the line. All blocks must be laid level with the mason's line and 1/16 inch from the wall line with full head and bed joints of uniform thickness.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Trowel	Modular ruler	Mortar	Safety goggles
Level	Brick chisel	Mortar pan	Common bricks
Square	Mason line		

PERFORMANCE STEPS:

1. Cut 4 six inch pieces.
2. Dry bond full header course to given dimensions.
3. Square and mark each corner.
4. Remove all bricks.
5. Set 4 six inch pieces on desired course.
6. Lay full header course flat across the wall.

ENABLING OBJECTIVES:

Describe the procedure for laying a full header course to a line

Demonstrate the use of a mason's line

Demonstrate techniques for making uniform head and bed joints

Identify the materials used as reinforcement in laying concrete block walls

Explain the purpose of a header course

Demonstrate how to butter brick to lay in a header position

Explain the relevant safety precautions/procedures

TASK #: 2.7.2. Lay a rowlock course

PERFORMANCE STANDARD: Given the necessary tools and equipment, lay a rowlock course. The course must be straight and level with no holes or cracks and the joints must be smooth, uniform and waterproof.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Level	Mason line	Jointer	Mortar pan
Trowel	Modular ruler	Mortar	Safety goggles
Square	Chalk line	Bricks	

PERFORMANCE STEPS:

1. Scale course to determine number of bricks required for course.
2. Apply mortar to edges of brick to be laid.
3. Place brick on edge with 2-1/4" and 4" end facing out.
4. Continue with process until course is complete.
5. Point and joint course.

ENABLING OBJECTIVES:

Discuss where masonry rowlocks are used

Explain why it is essential for all vertical joints to be completely filled

Explain the procedure and demonstrate the correct way to lay a rowlock course

Explain the relevant safety precautions/procedures

TASK #: 2.7.3. Lay a sailor course

PERFORMANCE STANDARD: Given the necessary tools and equipment, lay a sailor course. The sailor course must be straight and level with no holes or cracks and the joints must be smooth, uniform and waterproof.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Mason line	Jointer	Mortar pan
Level	Mason rule	Mortar	Safety goggles
Square	Chalk line	Bricks	

PERFORMANCE STEPS:

1. Scale course to determine number of bricks required for course.
2. Apply mortar to edges of brick to be laid.
3. Lay brick on end with 4"x8" side facing out.
4. Continue with process until course is complete.
5. Point and joint course.

ENABLING OBJECTIVES:

Discuss the use of sailor courses

Explain why it is essential for all vertical joints to be completely filled

Explain the procedure and demonstrate the correct way to lay a sailor course

Explain the relevant safety precautions/procedures

TASK #: 2.7.4. Lay a shiner course

PERFORMANCE STANDARD: Given the necessary tools and equipment, lay a shiner course. The shiner course must be straight and level with no holes or cracks and the joints must be smooth, uniform and waterproof.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Mason line	Jointer
Level	Mason rule	Mortar
Square	Chalk line	Bricks
Mortar pan		

PERFORMANCE STEPS:

1. Scale course to determine number of bricks required for course.
2. Apply mortar to edges of brick to be laid.
3. Lay brick on edge with 4"x8" side facing out.
4. Continue process until course is complete.
5. Point and joint course.

ENABLING OBJECTIVES:

Discuss where masonry shiner courses are used.

Explain why it is essential for all vertical joints to be completely filled

Explain the procedures and demonstrate the correct way to lay a shiner course

Explain the relevant safety precautions/procedures

TASK #: 2.7.5. Lay a soldier course

PERFORMANCE STANDARD: Given the necessary tools and equipment, lay a soldier course. The course must be straight and level with no holes or cracks and the joints must be smooth, uniform and waterproof.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Mason line	Jointer	Mortar pan
Level	Modular ruler	Mortar	Bricks
Square	Chalk line	Trowel	

PERFORMANCE STEPS:

1. Scale course to determine number of bricks required for the course.
2. Apply mortar to edges of brick to be laid.
3. Lay brick on end with 2-1/4"x8" side facing out.
4. Continue with process until course is complete.
5. Point and joint course.

ENABLING OBJECTIVES:

Discuss the use of soldier courses

Explain why it is essential for all vertical joints to be completely filled

Explain the procedure and demonstrate the correct way to lay a soldier course

Explain the relevant safety precautions/procedures

TASKS #: 2.7.6. Lay a stretcher course

PERFORMANCE STANDARD: Given specifications for a stretcher course, blocks, mortar, and the necessary tools and materials, lay a stretcher course to the line. All blocks must be laid level with the mason's line and 1/16 inch from the wall line with full head and bed joints of uniform thickness.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Trowel	Chalk line	Mortar pan
Level	Mason line	Mortar
Square	Common bricks	Modular ruler
Safety goggles		

PERFORMANCE STEPS:

1. Dry bond a stretcher course along chalk line.
2. Gage the head joints at 3/8 inch.
3. Bed up end bricks on 6.
4. Level and plumb end bricks.
5. Place a line from one end brick to the other.
6. Remove 3 bricks at a time and replace them in mortar.
7. Continue with the procedure in step 6 until all bricks are laid in mortar.

(NOTE: All bricks must be laid plumb, level and straight with the line.)

ENABLING OBJECTIVES:

Describe the procedure for laying a stretcher course to a line

Demonstrate the use of a mason's line

Demonstrate techniques for making uniform head and bed joints

Identify the materials used as reinforcement in laying concrete block walls

Discuss the procedure to lay a stretcher course

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.8: Lay American bond and English bond pattern.

TASK(S): 2.8.1. Lay an American bond pattern (common bond)
2.8.2. Lay an English bond pattern

TASK #: 2.8.1. Lay an American (common) bond pattern

PERFORMANCE STANDARD: Given plans and specifications for American bond (common) wall, bricks, mortar, and the necessary tools, equipment, and materials, lay an American (common) bond wall. The pattern must be uniform, the wall must be plumb, straight, and level, within $\pm$1/16 inch of specifications for length, height, and width, and have uniform joints.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Modular ruler	Mortar pan
Trowel	Jointer	Brush
Level	Mortar	Common bricks

PERFORMANCE STEPS:

1. Lay the bond out dry.
2. Lay first course brick in mortar with veneer bond and on 6 using brick spacing rule.
3. Level and square the first course.
4. Cut four 6" pieces.
5. Bed 6" piece on each corner on 6.
6. Lay full headers between 6" pieces.
7. Level and plumb header course.
   a. Plumb each joint or corner.
   b. Plumb the face side of each corner.
   c. Straight edge the face and kiln side of wall.
8. Lay five courses of the veneer bond.
9. Repeat steps 4 through 8.
10. All work must be ranged, jointed, and pointed.

ENABLING OBJECTIVES:

Define American bond pattern

Discuss the procedure for laying a common bond pattern

Measure, mark and cut a 6 inch piece

Draw out course and explain how to space bricks on the stretcher and veneer courses

Explain the procedures for ranging, jointing and pointing

Explain the relevant safety precautions/procedures

Task #: 2.8.2. Lay an English bond pattern

PERFORMANCE STANDARD: Given plans and specifications for English bond wall, bricks, mortar and the necessary tools, equipment and materials, lay an English bond wall. The pattern must be uniform, the wall must be plumb, straight and level within $\pm$1/16 inch of specifications for length, height and width, and have uniform joints. The joints of the stretchers center on the stretchers two courses above and below; headers center on headers.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Modular ruler	Mortar pan
Trowel	Jointer	Mortar
Level	Brush	Brick (face a building)

PERFORMANCE STEPS:

1. Lay the bond out dry.
2. Lay first course brick in mortar using stretcher pattern.
3. Use quarter closures on alternating sides of the corner in every other course.
4. Level and square the first course.
5. Lay the second course in mortar using the header pattern.
6. Level and square the first course.
7. Repeat steps 2 through 6 until desired height of wall is reached.
8. All work must be ranged, jointed, and pointed.

ENABLING OBJECTIVES:

Define English bond pattern

Discuss the steps in laying an English bond pattern

Measure, mark, and cut quarter closures

Draw out course and explain how to space brick on the stretcher and header courses

Explain the procedures for ranging, jointing and pointing

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.9: Tool concave and convex joints.

TASK(S): 2.9.1. Tool concave joints
2.9.2. Tool convex joints

TASK #: 2.9.1. Tool concave joints

PERFORMANCE STANDARD: Given necessary equipment, tools, supplies and specifications, tool concave joints. All joints must be uniformly concave and smooth with no double imprints.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Concave jointer	Brush	Safety goggles
Mortar	Mortar pan	Fresh wall
Brick	Trowel	

PERFORMANCE STEPS:

1. Select concave jointer to be used.
2. Test mortar to see if it is ready to be jointed.
3. Strike head joints from bottom of the wall up with head jointer (short concave).

4. Strike bed joints from bottom of the wall up with sled runner by pushing along the wall with curved portion up front.
5. Fill and finish cracks or holes in joints.
6. Brush, rejoint and clean all joints.

ENABLING OBJECTIVES:

Explain the use and care of the concave jointer

Explain and demonstrate how to tool concave joints

Explain the relevant safety precautions/procedures

TASK #: 2.9.2. Tool convex joints

PERFORMANCE STANDARD: Given necessary equipment, tools, supplies and specifications, tool convex joints. All joints must be uniformly convex and smooth with no double imprints.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Mortar	Brush	Existing wall
Convex hand jointer	Trowel	Brick
Convex sled runner	Mortar pan	Safety goggles

PERFORMANCE STEPS:

1. Test mortar to see if it is ready to be jointed.
2. Strike head joints from the bottom of the wall up, using a convex hand jointer.
3. Strike bed joints from bottom of the wall up with convex sled runner by pushing along the wall with curved portion up front.
4. All joints must be free of holes or cracks after tooling.
5. Brush, rejoint and clean all joints.

ENABLING OBJECTIVES:

Explain the use and care of the convex jointer and sled runner

Explain and demonstrate how to tool convex joints

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.10: Lay corners.

TASK(S): 2.10.1. Lay corners

TASK #: 2.10.1. Lay corners

PERFORMANCE STANDARD: Given necessary equipment, tools, supplies and specifications, lay a corner. The corner must be square, level, plumb, straight edged and all courses laid on the same building specifications scale.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Rule	Trowel	Framing square
Safety goggles	Level	Mortar mix
Pencil	Convex jointer	

PERFORMANCE STEPS:

1. Form a 90 degree angle on the floor.
2. Dry bond the corner out to 6 bricks and 5 bricks to form a 90 degree angle.
3. Bed up corner brick on the 6 brick side on the prescribed scale.
4. Level and plumb corner brick.
5. Bed up brick 6, level from corner brick to brick 6 and plumb brick 6.
6. Remove brick 2 through 5 and replace them in mortar.
7. Level and straight edge the bricks.
8. Bed up brick 5, level from corner brick to brick 5 and plumb brick 5.
9. Repeat steps 6 and 7 to complete side.
10. Check and re-square corner if needed.
11. Establish bond pattern on both sides.
12. Complete desired height of additional courses by following steps 3, 4 and 5.

ENABLING OBJECTIVES:

Explain and demonstrate the procedure in laying corners

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.11: Tool rake joints, squeeze joints, trowel struck joints and V joints.

TASK(S):
- 2.11.1. Tool rake joints
- 2.11.2. Tool squeeze joints
- 2.11.3. Tool trowel struck joints
- 2.11.4. Tool V joints

TASK #: 2.11.1. Tool rake joints

PERFORMANCE STANDARD: Given necessary equipment, tools, supplies and specifications, tool rake joints. All joints must be uniformly raked, smooth, clean, free of holes and to the depth stated in the specifications.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Rake jointer	Bricks	Safety goggles
Mortar	Trowel	Mortar pan
Brush		

PERFORMANCE STEPS:

1. Adjust rake jointer to specified depth.
2. Test mortar to be sure it is hard enough not to smear.
3. Strike head joints from the bottom of the wall up with rake jointer.
4. Strike bed joints from bottom of the wall up with rake jointer.
5. Brush, rejoint and clean all joints.

ENABLING OBJECTIVES:

Explain and demonstrate how to use a rake jointer

Explain the relevant safety precautions/procedures

TASK #: 2.11.2. Tool squeeze joint

PERFORMANCE STANDARD: Given necessary equipment, tools and supplies, tool squeeze joints. All bricks must be level with squeezed mortar appearing on all joints.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Brush	Mortar
Trowel	Level	

PERFORMANCE STEPS:

1. Select solid bricks to be used for squeeze joints.
2. Butter bricks with full head joints.
3. Shove head joints together without cutting off excess mortar.
4. Press brick down to line without cutting off excess mortar.

ENABLING OBJECTIVES:

Explain how squeeze joints are made

Explain the relevant safety precautions/procedures

TASK #: 2.11.3. Tool trowel struck (flush) joints

PERFORMANCE STANDARD: Given a brick wall with unfinished joints and a trowel, finish the joints. The trowel should be kept almost parallel to the face of the wall while drawing the point of the trowel along the joint. The joints must be smooth with the surface of the bricks and have no cracks or holes in the joints.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Brush
Trowel	Water

PERFORMANCE STEPS:

1. Test mortar to see if it is ready to be struck.
2. Hold trowel almost parallel to the face of the wall and draw the point of the trowel along the joint.
3. Fill and finish cracks or holes in the joints.
4. Brush and clean all joints.

ENABLING OBJECTIVES:

Describe procedure for testing mortar joints for readiness for jointing

Describe the use of the trowel in making the joints

Describe the use of a trowel in cutting off tags of mortar

Explain the relevant safety precautions/procedures

TASK #: 2.11.4. Tool V joint

PERFORMANCE STANDARD: Given necessary equipment, tools, and supplies, tool V joints. All joints must be uniformly V tooled and smooth with no double imprints.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

V jointer	Bricks	Safety goggles
Mortar	Trowel	Brush
Mortar pan		

PERFORMANCE STEPS:

1. Select V jointer to be used.
2. Test mortar to see if ready to be jointed.
3. Strike head joints from bottom of the wall up with short V jointer.
4. Strike bed joints from bottom of the wall up with long V jointer by pushing along the wall with curved portion up front.
5. Fill and finish joints with cracks or holes.
6. Remove excess mortar.

ENABLING OBJECTIVES:

Explain and demonstrate how to tool V joints

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.12: Mix cement mortar.

TASK(S): 2.12.1. Mix cement mortar (by machine)
2.12.2. Mix cement mortar (by hand)

TASK #: 2.12.1. Mix cement mortar (by machine)

PERFORMANCE STANDARD: Given necesssary equipment, supplies and mix specifications, mix masonry cement mortar in power mixer. Mixed mortar must have uniform color throughout and slide gradually from the trowel.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Power mixer	Mortar mix	Bucket
Shovel	Sand	Trowel
Mortar box	Water	Safety goggles

PERFORMANCE STEPS:

1. Pour water into power mixer while mixer is operating.
2. Add 1/2 of the masonry sand to the water.
3. Empty mortar mix into sand and water in power mixer.
4. Add other 1/2 of sand to mix in power mixer.
5. Allow power mixer to mix the contents 3 to 5 minutes, until mortar and sand becomes one color.
6. Pour mixed mortar from power mixer into mortar box.

ENABLING OBJECTIVES:

Explain operation of power mixer

Identify the parts of the power mixer

Explain the step in filling of mixer

Explain the steps for dumping the mixer

Discuss the importance of following directions in mixing sand, water, and mortar mix

Discuss the proper care of the power mixer before and after use

Demonstrate the procedure in mixing the ingredients for masonry cement mortar

Explain the relevant safety precautions/procedures

TASK #: 2.12.2. Mix cement mortar (by hand)

PERFORMANCE STANDARD: Given necessary equipment, supplies and mix specifications, mix masonry cement mortar by hand. Mixed mortar must have uniform color throughout and slide gradually from the trowel.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Trowel	Water bucket	Safety goggles
Mortar box	Water	Mortar wheelbarrow
Square shovel	Dry mix ingredients	

PERFORMANCE STEPS:

1. Locate and level mortar box.
2. Place 1/2 sand needed for mix in mortar box and then level the sand.
3. Add dry mix ingredients, add remaining half of sand to the mortar box.
4. Blend the dry ingredients together with the shovel or hoe and push them to one end of the mortar box.
5. Add water to mix.
6. Mix water and dry ingredients.
7. Push mortar to one end of the box and test mortar with trowel.
8. Wet inside of wheelbarrow before putting mixture in.
9. Clean equipment with water.

ENABLING OBJECTIVES:

Identify hand tools

Explain ingredients of mixture

Identify proportions of mixture

Explain mixing process

Discuss storing the mixing materials in a dry place near the mixing area for efficiency

Discuss standard proportions for mortar

Review why clean sand and water are important to the mix

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.13: Point a wall.

TASK(S): 2.13.1. Point a wall

TASK #: 2.13.1. Point a wall

PERFORMANCE STANDARD: Given necessary equipment, tools and supplies, point a wall. All joints must be full and finished.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Finished wall to be pointed	Mortar	Hammer
Trowel	Chisel	Tuck pointer (slicker)
Brush	Water	Safety goggles

PERFORMANCE STEPS:

1. Stand back from the wall and observe for cracks and holes.
2. Chisel cracks where necessary.
3. Wet cracks after chiseling.

4. Place mortar in cracks and holes by using pointing trowel and truck pointer then brush.
5. Refinish joints by matching previous jointing.

ENABLING OBJECTIVES:

Explain and demonstrate the procedure in pointing a wall

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.14: Reinforce brick masonry.

TASK(S): 2.14.1. Reinforce brick masonry

TASK #: 2.14.1. Reinforce brick masonry

PERFORMANCE STANDARD: Given necessary equipment, tools and supplies, reinforce brick masonry with reinforcement wire. Reinforcement wire must be placed horizontally 16 inches on center and must not be exposed to the face of the wall.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Chalk line	Rectangular tie
Brick hammer	Anchors	Z-tie wall ties
Wire cutters	Rule	

PERFORMANCE STEPS:

1. Select wire for size of wall being built.
2. Place wire in center of wall, horizontally, 16 inches in center.
3. Overlap each adjoining section of wire.
4. Bend wire around each corner.
5. Extend wire for adjoining walls.

ENABLING OBJECTIVES:

Identify the uses of reinforcement wire

Determine the location of the wire

Determine the strength the wall is designed for

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #2.15: Use anchors to tie walls together and doors to walls.

TASK(S): 2.15.1. Use anchors to tie walls together and doors to walls

TASK #: 2.15.1. Use anchors to tie walls together and doors to walls

PERFORMANCE STANDARD: Given necessary equipment, tools, supplies and building specifications, use anchors to tie walls together. All anchors must be affixed horizontally on 16 or 32 inch centers as specified in the building specifications and 16 inches apart vertically.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Rule	Chalk line
Brick hammer	Nails	Claw hammer
Corrugated veneer wall ties		

PERFORMANCE STEPS:

1. Affix wall anchors to existing structure according to specifications.
2. Lay outside wall and bend anchors on top of proper courses.

ENABLING OBJECTIVES:

Identify types of anchors

Explain purpose of anchors

Explain steps used in installing anchors

Explain the relevant safety precautions/procedures

PROGRAM OF STUDY: Industrial and Technical Education

AREA OF STUDY: Masonry

LEVEL: 11-12

UNIT #3: Construct Residential Chimneys and Fireplaces

LEARNING OUTCOME #3.1: Build double face and single face chimneys

TASK(S): 3.1.1. Build double face chimney (smoke chamber)
3.1.2. Build single face chimney (smoke shelf)

TASK #: 3.1.1. Build double face chimney (smoke chamber)

PERFORMANCE STANDARD: Provided with necessary equipment, tools, building specifications, build a double face chimney. Corbeling must not exceed 1-1/2 inches per course, all courses evenly corbeled, and all joints must have full head joints.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Ash dump	Mortar	Framing square
Damper	6 ft. rule	Bevel square
Fire brick	Trowel	Soft hand brush
Safety goggles	Brick hammer	Mortar board
Square shovel	Pail	Wheelbarrow
Sand		

PERFORMANCE STEPS:

1. Re-establish original 8 inch wall above smoke shelf, approximately 8 inches back of damper.
2. Build 8 inch wall straight up.
3. Corbel side walls evenly.
4. Corbel front walls to fit inside of flue lining.
5. Plaster smoothly underneath corbels.
6. Remove excess masonry materials around damper.

ENABLING OBJECTIVES:

Explain functions of a chimney

Identify the code standards for chimney dimensions

Describe recommended dimensions for chimney footings

Define flashing and counterflashing.

Describe specifications for the cap of the chimney

Explain why correct mortaring procedures are of vital importance in chimney construction

Explain the relevant safety precautions/procedures

TASK #: 3.1.2. Build single face chimney

PERFORMANCE STANDARD: Given necessary equipment, tools and building specifications, build a smoke shelf. The smoke shelf must be directly under the bottom of the flue, extend the full width of the throat and constructed horizontally.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Ash dump	Mortar	Brick set	Soft hand brush
Damper	6 ft. rule	Level	Square shovel
Fire brick	Trowel	Framing square	Pail
Common brick	Brick hammer	Bevel square	Wheelbarrow
Sand	Mortar board	Safety goggles	

PERFORMANCE STEPS:

1. Fill in solid with masonry materials behind back of fireplace.
2. Spread mortar horizontally on top of fill masonry material.
3. Smooth mortar horizontally on top of fill masonry material behind damper.
4. Remove excess masonry material around damper.

ENABLING OBJECTIVES:

Explain functions of a chimney

Identify the code standards for chimney dimensions

Describe recommended dimensions for chimney footings

Define flashing and counterflashing

Describe specifications for the cap of the chimney

Explain why correct mortaring procedures are of vital importance in chimney construction

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #3.2: Cut a flue lining and set a flue.

TASK(S): 3.2.1. Cut a flue lining
3.2.2. Set flue lining

TASK #: 3.2.1. Cut a flue lining

PERFORMANCE STANDARD: Given a flue liner, chisel and said, cut a flue liner. Cut flue liner must be square and uncracked.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Brick hammer	Sand	Safety goggles
Chisel	Rule	Square
Flue liner	Pencil	

PERFORMANCE STEPS:

1. Measure length to be cut around flue lining.
2. Trace line completely around flue lining.
3. Fill flue lining with damp sand.
4. Pack sand in flue lining.
5. Tap lightly with hammer and sharp chisel along the line where cut is to be made.

(NOTE: Wear safety shield.)

ENABLING OBJECTIVES:

Identify, select, and demonstrate the use of various types of chisels

Describe the techniques for marking around a flue liner

Explain the relevant safety precautions/procedures

TASK #: 3.2.2. Set flue lining

PERFORMANCE STANDARD: Given specifications for a flue, brick, mortar, and the necessary tools, equipment, and materials, set flues. Bed joints between flues must be smooth, free of holes, sealed and set in line with the previous flues.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Brick	Flue specifications	Safety goggles
Mortar	Brick hammer	Rule
Flue lining	Brick chisel	Pencil
Trowel		

PERFORMANCE STEPS:

1. Spread mortar on top of last corbel in smoke chamber.
2. Set flue in mortar.
3. Cut off protruding mortar inside flue lining.
4. Build exterior back up walls of chimney to approximately 6 inches below the flue lining.
5. Spread mortar on top of first flue lining.
6. Set second flue lining in mortar directly over first flue lining.
7. Repeat step number three.
8. Continue this process until specified height is reached.

ENABLING OBJECTIVES:

Identify various materials used to construct flues

Demonstrate spreading mortar on flues

Discuss various sizes of flues

Explain height requirements above the roof

Identify various techniques for constructing flues

Determine situations in which more than one flue is needed in chimney construction

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #3.3: Install ash dump and clean-out door.

TASK(S): 3.3.1. Install ash dump
3.3.2. Install clean-out door

TASK #: 3.3.1. Install ash dump

PERFORMANCE STANDARD: Given necessary equipment, tools, supplies and specifications, install an ash dump. The ash dump must fit in center of fire brick floor within 2 to 3 inches of back of fire box and door swings to the back of fire box when open.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Blueprints	Ash dump door	Trowel
Fire brick	Level	Safety goggles
Fireproof mortar	Steel tape	

PERFORMANCE STEPS:

1. Measure size of ash dump.
2. Establish center point of fire box.
3. Measure 2 or 3 inches from back of fire box.
4. Cut fire brick in floor to fit desired opening.*
5. Place ash dump over opening.

(*NOTE: Door of dump must not come in contact with underneath fire brick when open.)

ENABLING OBJECTIVES:

Identify types of ash dump doors

Discuss fire bricks and their use

Describe procedure for installing an ash dump

Explain relevant safety precautions/procedures

TASK #: 3.3.2. Install clean-out door

PERFORMANCE STANDARD: Given necessary equipment, tools, supplies and specifications, install a clean-out door. The door must set level and plumb in place with bricks laid behind the lip of the door.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Specifications	Mortar	Safety goggles
Clean-out door	Trowel	Brick chisel
Brick	Brick hammer	Square
Chalk line	Ruler	Level

PERFORMANCE STEPS:

1. Check size of clean-out door.
2. Measure to center of chimney.
3. Place center of clean-out door at center of chimney.
4. Plumb and level the door.
5. Brick tightly around the door and anchor to bricks.*
6. Place necessary lintel to cross over top of door.

(NOTE: *Bricks must be laid tightly behind lip of clean-out door.)

ENABLING OBJECTIVES:

Demonstrate the procedure for placing the door

Explain the use of the door

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #3.4: Insert a damper.

TASK(S): 3.4.1. Insert a damper

TASK #: 3.4.1. Insert a damper

PERFORMANCE STANDARD: Given the necessary equipment, tools, supplies and specifications insert a damper. The inserted damper when open must draw all smoke forcefully up the throat of the chimney.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Damper specifications	Damper	Safety goggles
Brick	Brick hammer	Trowel
Mortar	Level	Pencil
Chalk line	Wrench	Pliers

PERFORMANCE STEPS:

1. Assemble damper door.
2. Assemble door catch or stopper.
3. Assemble door handle.
4. Embed flange in mortar spread on fire brick.
5. Align damper with front face of fire bricks.
6. Seal with mortar.

ENABLING OBJECTIVES:

Describe procedure for assembling and installing a damper

Explain importance of a damper

Discuss steel and cast iron dampers

Explain relevant safety precautions/procedures

LEARNING OUTCOME #3.5: Lay a hearth, mantel, throat, back, bottom, and side of fireplace.

TASK(S):
- 3.5.1. Lay a hearth
- 3.5.2. Lay a mantel
- 3.5.3. Lay a throat
- 3.5.4. Lay back of fireplace
- 3.5.5. Lay bottom of fireplace
- 3.5.6. Lay side of fireplace

TASK #: 3.5.1. Lay a hearth

PERFORMANCE STANDARD: Given necessary equipment, tools, supplies and specifications, lay a hearth. The hearth must be level, square and plumb with full joints and set in 3/8 inch mortar bed. Top of hearth must be level with fire box floor (inner hearth).

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

- Specifications
- Brick or other masonry units
- Mortar
- Safety goggles
- Brick hammer
- Trowel
- Level

PERFORMANCE STEPS:

1. Check plans for hearth arrangement.
2. Bond and lay out the outside of hearth.
3. Fill inside of hearth with masonry material.
4. Lay hearth level with fire box floor (inner hearth).
5. Point and tool joints.

ENABLING OBJECTIVES:

Explain the importance of hearths

Discuss various hearth sizes and heights

Discuss various finishes on hearths

Describe the procedure for laying a raised hearth

Explain the relevant safety precautions/procedures

TASK #: 3.5.2. Lay a mantel

PERFORMANCE STANDARD: Given specifications for a mantel, brick, mortar, and the necessary tools, equipment and materials, lay a mantel. Each corbel must not project more than one inch and each corbeled course must be straight, level, and plumb.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Specifications	Trowel	Jointer
Brick	Level	Brick hammer
Mortar	Safety goggles	Brick set
Square	Chalk line	Steel tape
Folding rule		

PERFORMANCE STEPS:

1. Lay out mantel according to given dimensions.
2. Dry bond bricks to given dimensions to establish necessary cuts.
3. Lay mantel to approximately 8 inches below damper.
4. Secure and set angle iron having at least 8 inch bearing.
5. Lay brick across angle iron to desired height.
6. Corbel as necessary for mantel shelf.

ENABLING OBJECTIVES:

Explain techniques of corbeling

Describe various kinds of mantels

Describe the procedure for securing the mantel onto the masonry

Explain the relevant safety precautions/procedures

TASK #: 3.5.3. Lay a throat

PERFORMANCE STANDARD: Given specifications, brick, mortar, and the necessary tools, equipment and materials, lay throat. The throat must be sloped to support the back of the damper and must be from 6 to 8 inches above the fireplace opening.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Throat specifications	Safety goggles	Steel tape
Brick	Trowel	Brick hammer
Mortar	Rule	Brick set
Folding rule	Brush	

PERFORMANCE STEPS:

(NOTE: The throat is the most critical spot in the fireplace and should not be less than 6" above the highest point of fireplace opening.)

1. Study the fireplace design.
2. Lay out the cross-sectional area of the throat.
3. Determine the length of the throat.
4. Set throat 6" to 8" above the lintels and no more than 4" to 6" wide.

ENABLING OBJECTIVES:

Explain the procedures for laying a throat

Explain the importance of the throat

Explain the relevant safety precautions/procedures

TASK #: 3.5.4. Lay back of fireplace

PERFORMANCE STANDARD: Given the necessary equipment, tools and specifications, lay the back of a fireplace. Back of fireplace must begin sloping forward from 14 to 16 inches above fireplace and should fit underneath the flange and be smooth with the inside opening of the damper. The mortar joints should not exceed 3/8 inch in thickness.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Brick hammer	Square
Fire brick	Level	Jointer
Trowel	Chalk line	Brush
Mortar	Rule	

PERFORMANCE STEPS:

1. Get dimensions of damper to be used in fireplace.
2. Mark the line for base of back wall according to damper size.
3. Dry bond the back wall according to damper size.
4. Remove dry bond and lay bricks in place.
5. Lay bricks plumb, straight and level to a height of 14 to 16 inches, then level to fit the bottom flange of the damper.
6. Finish joints.

ENABLING OBJECTIVES:

Identify slope

Explain and demonstrate the procedures for measuring and marking the slope

Explain and demonstrate the procedure for laying the back of the fire place

Identify procedures for finishing joints

Explain the relevant safety precautions/procedures

TASK #: 3.5.5. Lay bottom of fireplace

PERFORMANCE STANDARD: Given the necessary equipment, tools and specifications, lay the fireplace bottom. The bottom must be level and laid in desired bond with the back and side walls. The mortar joints should not exceed 3/8 inch in thickness and all joints fully filled and finished.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Brick chisel	Chalk line
Level	Trowel	Mortar
Jointer	Square	Bricks
Brick hammer	Rule	Brush

PERFORMANCE STEPS:

1. Measure depths and widths of the fireplace opening.
2. Dry bond the front, sides and rear of fireplace.
3. Lay and level fireplace bottom.
4. Finish joints.

ENABLING OBJECTIVES:

Determine the dimensions of the bottom of the fireplace

Lay out the bottom of the fireplace

Course brick on line before applying mortar

Remove trial run, place mortar and lay brick

Joint the mortar to insure good bond

Explain the relevant safety precautions/procedures

TASK #: 3.5.6. Lay side of fireplace

PERFORMANCE STANDARD: Given the necessary equipment, tools and specifications, lay the sides of the fireplace. The sides must be level, plumb and straight edged. The joints must be 3/8 inches thick and bonded with back wall.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Brick chisel	Chalk line
Level	Trowel	Mortar
Jointer	Square	Bricks
Brick hammer	Rule	Brush

PERFORMANCE STEPS:

1. Measure and mark sides from front to rear of fireplace opening.
2. Dry bond side walls.
3. Remove dry bond and lay bricks in place.
4. Straight edge the first row of bricks.
5. Lay each successive layer level, plumb and straight.
6. Finish joints.

ENABLING OBJECTIVES:

Explain the steps in laying out the fireplace sides

Determine dimensions of sides

Explain the function of the sides

Explain the reasons for fire proofing the sides

Explain the relevant safety precautions/procedures

PROGRAM OF STUDY: Industrial and Technical Education

AREA OF STUDY: Masonry

LEVEL: 11-12

UNIT #4: Construct Building

LEARNING OUTCOME #4.1: Build partitions, jambs, sills.

TASK(S): 4.1.1. Build partitions
4.1.2. Construct jambs
4.1.3. Construct sills

TASK #: 4.1.1. Build partitions

PERFORMANCE STANDARD: Given a blueprint, building codes, partition dimensions, materials and equipment, build a partition. The partition must be of the thickness required to support the designated load or to conceal plumbing ties, heating ducts, etc. The partition thickness should always be in multiples of 2, such as 4" and 6". All openings, as for windows and doors, must have some form of lintel over their tops. The partitions must be level, plumb and straight.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Reinforcement wire or rods
Blocks	Trowel
Mortar	Chalk line
Brick hammer	

PERFORMANCE STEPS:

1. Lay out partition wall.
2. Determine dimensions of openings in partition.
3. Determine thickness of block to be used in the wall.
4. Lay block and install reinforcement as specified.
5. Install lintels and jambs and complete height of wall.
6. Joint the wall.
7. Brush off excess mortar and clean lintel and openings.
8. Remove support for lintel and openings.

ENABLING OBJECTIVES:

Describe procedure for laying out and marking location of partition

Discuss factors effecting thickness and finish of partition

Describe procedures for laying out and constructing openings

Explain the different requirements of partitions (load bearing versus non-load bearing)

Explain the safety procedures/precautions

TASK #: 4.1.2. Construct jambs

PERFORMANCE STANDARD: Given a set of blueprints, bricks and the necessary tools and materials, lay out and construct jambs. The cuts used must maintain proper pattern bond.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Brick hammer	Brush	Nails
Trowel	Line	Door frame	Hammer
Jointer	Steel tape	Window frame	Blueprint
Level	Folding rule	Braces	

PERFORMANCE STEPS:

1. Locate openings on floor plan.
2. Lay out openings.
3. Set frames on marks.
4. Drive nails through one end of 2x4 braces, place braces on top of window or door head. Brace lower end of 2x4 with wood stake or concrete block.
5. Plumb jambs and level head.
6. Lay surrounding wall to height of frame.
7. Apply mortar 1/2" deep to top of frame and to wall on both sides of frame.
8. Place steel lintels and bed in mortar.
9. Finish wall.

ENABLING OBJECTIVES:

Describe various bond patterns

Determine locations for required cuts when bonding walls

Locate windows and doors on blueprints

Explain the relevant safety precautions/procedures

TASK #: 4.1.3. Construct sills

PERFORMANCE STANDARD: Provided with necessary equipment, supplies, and building specifications, build a rowlock window sill. All bricks must be smooth and tight against the bottom of the window, all head joints equalized, and fall must be away from window. Projection of bricks must be equalized.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Trowel	Brick hammer
Brick	Level	Brick set
Mortar	Jointers	Square
Line	Steel tape	Rule
Brick chisel		

PERFORMANCE STEPS:

1. Install flashing.
2. Determine projection and desired fall.
3. Cut brick to desired projection and fall.
4. Course window sill to determine amount of brick needed.
5. Spread mortar on masonry under the bottom of the window where sill is to be laid.
6. Lay sill in place on courses.
7. Tool joints.
8. Remove excess mortar from sill.

ENABLING OBJECTIVES:

Identify different types of sills

Explain use and purpose of flashing

Demonstrate techniques for cutting sill bricks

Describe procedure for laying brick at an angle in constructing a sill

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #4.2: Install wall ties.

TASK(S): 4.2.1. Install wall ties

TASK #: 4.2.1. Install wall ties

PERFORMANCE STANDARD: Given necessary equipment, supplies and building specifications, install corrugated wall ties on veneer house. Wall ties must be affixed to the frame wall 16 inches on center horizontally and vertically and fastened to the masonry wall at 90 degree angle. Wall ties must not be visible on face side of wall.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Chalk line	Square
Nails	Steel tape	Level
Claw hammer	Rule	
Wall ties	Pencil	

PERFORMANCE STEPS:

1. Measure 16 inches vertically from starting point of frame structure on each end and mark.
2. Place chalk line horizontally on vertical measurements and chalk.
3. Space and affix wall ties on horizontal line 16 inches on center.
4. Continue to space and affix wall ties 16 inches on center both vertically and horizontally.
5. When wall reaches wall ties, bend ties on top of masonry at 90 degree angle.

6. Continue to build wall and follow same procedure as each wall tie height is reached.

ENABLING OBJECTIVES:

Identify types of wall ties and anchors

Explain purpose of drip in Z ties

Discuss the advantage of staggering ties

Explain nailing ties to wooden frame buildings

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #4.3: Lay a flight of steps.

TASK(S): 4.3.1. Lay a flight of steps

TASK #: 4.3.1. Lay a flight of steps

PERFORMANCE STANDARD: Provided necessary equipment, tools, supplies, and building specifications, lay three brick steps. Steps must be laid 3 feet by 3 feet with 7 inch risers, 12 inch treads, specified fall, level, plumb, straight edged and aligned.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Specifications	Jointer	Safety goggles
Brick	Plumb rule	Steel tape
Trowel	Level	Folding rule
Mortar	Square	Brush

PERFORMANCE STEPS:

1. Measure out 3 feet from given point.
2. Mark and square from given point.
3. Dry bond with stretcher course.
4. Lay stretcher course.
5. Fill in back up area with masonry material.
6. Dry bond and mark two rowlock courses back to back.
7. Lay rowlock courses in mortar with desired fall.
8. Repeat step 5.
9. Measure in 12 inches and follow same procedure for additional steps.

ENABLING OBJECTIVES:

Explain why a concrete foundation is a good approach in step building

Describe the procedure for pouring a concrete base to steps

Explain the procedure for laying out a flight of steps

Explain the relevant safety precautions/procedures

PROGRAM OF STUDY: Industrial and Technical Education

AREA OF STUDY: Masonry

LEVEL: 11-12

UNIT #5: Construct Concrete Masonry

LEARNING OUTCOME #5.1: Laying concrete blocks.

TASK(S): 5.1.1. Laying concrete blocks

TASK #: 5.1.1. Laying concrete blocks

PERFORMANCE STANDARD: Provided with necessary equipment, tools, supplies and building specifications lay a course of concrete block to a specified length with a corner block on each end. The blocks must be straight, level, plumb, with equalized joints vertically and horizontally (bed joint).

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Brush	Chalk line
Trowel	Square	Steel tape
Blocks	Level	Mortar

PERFORMANCE STEPS:

1. Check the length of the course and determine an accurate block layout.
2. Mark the position of the course of blocks with a chalk line.
3. Lay a full mortar bed and furrow with the trowel.
4. Lay the corner block first.
5. Butter face shell for vertical joint.
6. Align block in the first course.
7. Bring block to grade.
8. Plumb the block.
9. Align the blocks by tapping.
10. Cut off excess mortar.
11. Install the closure block.
12. Tool the joints.
13. Brush off excess mortar from blocks.

ENABLING OBJECTIVES:

Identify blocks and determine dimensions

Demonstrate method used in determining length of course and the number of units required

Explain how mortar joints thicknesses are determined

Identify the parts of the blocks and point out where the mortar is to be applied

Demonstrate the correct way to apply mortar

Explain how to level and plumb the blocks

Explain the procedures for jointing the blocks

Demonstrate the correct way to clean excess mortar from blocks

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #5.2: Place steel rods and reinforced wiring.

TASK(S): 5.2.1. Place steel rods
5.2.2. Place reinforced wiring

TASK #: 5.2.1. Place steel rods

PERFORMANCE STANDARD: Given plans and specifications for reinforced block wall, blocks, mortar and the necessary tools, equipment, and materials, construct a reinforced block wall. Reinforcing rods must not be more than 16 inches apart and the ends should overlap at least 5 inches. The walls must be straight, level, plumb, have uniform joints and no visibility of the reinforcement rods.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Reinforcing rods	Trowel
Blocks	Rod cutters	Jointer
Mortar	Wire	Specifications
Grout	Pliers	

PERFORMANCE STEPS:

1. Determine height of the wall from specifications.
2. Lay out first course dry.
3. Build leads on each end of wall.
4. Determine position of vertical and horizontal reinforcement rods.

   (NOTE: The rods may be already located in the footing.)

5. Place reinforcement rods every 16 inches and overlap rod at least 5 inches at the ends.
6. Place horizontal joint reinforcement where needed.
7. Lay walls around reinforcement rods and fill cavity with grout.
8. Continue the same steps until desired height of wall is reached.

ENABLING OBJECTIVES:

Determine size of reinforcing rods required for masonry walls of various heights and widths

Describe procedures for locating and setting reinforcing rods in walls

Determine where to apply grout for bonding a reinforced masonry wall

Identify grouting standards for walls of various thicknesses

Explain relevant safety precautions/procedures

TASK #: 5.2.2. Place reinforced wiring

PERFORMANCE STANDARD: Given necessary equipment, tools and supplies, reinforce brick masonry with reinforcement wire. Reinforcement wire must be placed horizontally 16 inches on center and must not be exposed to the face of the wall.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Safety goggles	Wire cutters	Rule
Wire	Tie wire	Chalk line

PERFORMANCE STEPS:

1. Select wire for size of wall being built.
2. Place wire in center of wall, horizontally 16 inches in center.
3. Overlap each adjoining section of wire.
4. Bend wire around each corner.
5. Extend wire for adjoining walls.

ENABLING OBJECTIVES:

Determine the size and design of reinforcement wire to be used

Describe procedures for locating and setting reinforcing wire in the wall

Demonstrate the procedures for bending, overlapping, and tying reinforcement wire

Explain relevant safety precautions/procedures

LEARNING OUTCOME #5.3: Install flashing.

TASK(S): 5.3.1. Install flashing

TASK #: 5.3.1. Install flashing

PERFORMANCE STANDARD: Given necessary equipment, tools, supplies and specifications, install flashing at slab level.

Flashing must be smooth, tightly secured and must not allow moisture penetration from outside to inside wall.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Specifications	Trowel	Rule
Flashing	Tin snips	Pencil
Nails	Level	Brick or blocks
Hammer	Square	Mortar
Safety goggles		

PERFORMANCE STEPS:

1. Select desired width of flashing to be used.
2. Roll out smooth on the wall and cut to length of wall.
3. Overlap flashing 12 inches when additional flashing is needed.
4. Seal overlap of flashing with flashing cement.
5. Place bottom of flashing at given height and recess 1/2 inch from face of outside wall.
6. Place top of flashing on inside wall at given height and recess 1/2 inch from inside wall.
7. Secure flashing by laying horizontal joint of inside and outside wall.

CAUTION: Do not puncture flashing.

ENABLING OBJECTIVES:

Explain the purpose of flashing

Select flashing for various installations

Determine correct height for flashing installation

Describe the procedure for installing flashing

Explain the relevant safety precautions/procedures

LEARNING OUTCOME #5.4: Set stone.

TASK(S): 5.4.1. Set stone

TASK #: 5.4.1. Set stone

PERFORMANCE STANDARD: Given specifications for a stone construction, stone, mortar, and the necessary tools, equipment, and materials, set precast stone. Stone must be level and plumb with uniform joints tooled to the specified finish.

TOOLS, RESOURCES, EQUIPMENT AND SITUATION(S):

Precast stone	Hammer	Jointer
Mortar	Level	Blueprints
Mortar board	Line	Safety goggles
Trowel	Line blocks	

PERFORMANCE STEPS:

1. Set corner stone at each end of structure.
2. Attach line for alignment.
3. Lay each piece approximately 1/16" away from line or 1/2 the thickness of line being used. Each piece should be faced.
4. Lay out remainder of stone and tool joints.

ENABLING OBJECTIVES:

Select type of mortar required for various types of precast stone

Describe the procedure for setting precast stone

Explain the relevant safety precautions/procedures